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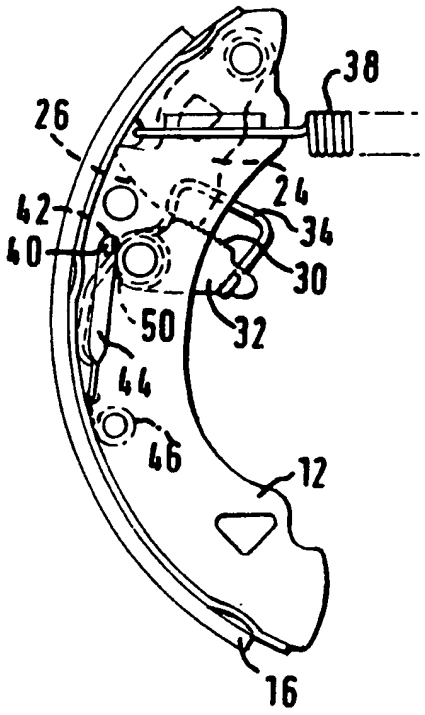
(54) Title: A DRUM BRAKE



(57) Abstract

A drum brake has an adjuster comprising a lever member (24) and pawl member (32) mounted on one brake shoe (12) having mutually engaging toothed surfaces (26, 30), the pawl member (32) being urged against the lever member (24) by a spring (34). The lever member (24) is movable by a strut attached to the other brake shoe (14) to operate the adjuster. A locking element comprising a locking member (40) is operated via a lever (44) by a bimetallic strip (46). When the shoe (12) heats up the bimetallic strip causes the locking element (40) to move so that an engagement surface (42) thereon the pawl (32) at any point along the engagement surface (42) to lock it against rotation and prevent adjustment.

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A DRUM BRAKE

The present invention relates to drum brakes and in particular to adjusters for drum brakes in which the adjuster is disabled when the drum becomes overheated, to prevent over adjustment of the brake.

GB 1 483 693 discloses an adjuster comprising an adjuster lever member and a pawl member having mutually engaged surfaces and being rotatable about respective axes and a stop mounted on a bimetal strip such that, when the drum is heated above a certain temperature, the stop moves into a position where the pawl will abut against the stop after rotating slightly, thereby preventing adjustment.

However the position of the adjuster lever and pawl varies gradually as the brake pads wear and the simple abutting engagement between the stop and the pawl does not take account of this.

The present invention provides a drum brake assembly for a motor vehicle comprising an actuator mounted between opposed brake shoe ends and operable to move said ends apart to apply the brakes, and an adjuster comprising a strut having one end constrained to move with one brake shoe and the other end of the strut engaging a lever member, pivotted to the other

brake shoe, to rotate the lever member in one direction of rotation if the brake shoe ends move apart by more than a predetermined amount, said lever member being engageable with a reaction member also pivotted to said other brake shoe and used to engage the lever member to allow rotation of the lever member in said one direction of rotation but not in the other, and a thermally responsive locking means engageable with said one member when said member is in any one of a range of positions.

Preferably the said one member is locked by frictional engagement between the locking means and the said one member. This enables the range of positions to be a continuous range. Alternatively the locking means and the said one member can have interengaging teeth such that the said one member can be locked in any of a range of discrete positions.

Preferably the locking means includes a locking member rotatable into and out of engagement with the said one member, and the locking means may also include a lever one end of which is acted upon by a thermally responsive element. This enables a good mechanical advantage to be obtained thereby locking the said one member firmly.

The locking means preferably includes a thermally responsive element which may comprise a coil or strip of bimetal or memory metal.

Preferred embodiments of the present invention will now be described by way of example only with reference to the accompanying drawings in which:-

Fig 1 is an elevation of a known drum brake;

Fig 2 is an elevation of a shoe of a drum brake and an adjuster according to a first embodiment of the present invention;

Fif 3 and Fig 4 are elevations of a locking element of the adjuster of Fig 2;

Fig 5 is a further embodiment similar to that shown in Fig 2;

Fig 6 is an enlargement of the strut and lock means of Fig 5

Fig 7 is an elevation of a shoe of a drum brake and an adjuster according to a second embodiment of the invention;

Fig 8 is an elevation of the part of the adjuster of Fig 5; and

Figs 9 and 10 are sections on line VII - VII of Fig 5 showing the adjuster in two different positions;

Referring to Fig 1 a known drum brake comprises a back plate

8, a drum 10, two shoes, 12, 14 mounted on the backplate having friction facings 16, 18 mounted thereon, the shoes having one end supported against a fixed abutment 20, and a strut 22 acting between the other ends of the shoes to limit the distance the shoes move together under the bias of the return spring (38) (see Fig 2)

One of the shoes 14 has a strut 22 constrained to move with said one shoe by a spring (not shown) in the conventional manner. The other shoe 12 has an adjuster lever 24 mounted thereon pivotable about an axis X. The lever 24 has teeth 26 on its free end 28 which engage with teeth 30 on an adjuster pawl 32 also mounted on said other shoe 14. The pawl 32 is rotatable about an axis Y and is urged against the adjuster lever 24 by a spring 34 (Fig 2). A projection on the strut 22 engages with play in an aperture 36 in the adjuster lever 24 and acts against the adjuster lever to hold the shoe 12 away from the other shoe 14. The shoes are urged together and against the strut 22 by the spring 38.

When the shoes are urged apart, for example by a hydraulic cylinder 9 acting between the ends of the shoes remote from the fixed abutment 20 the strut 22 is held against the shoe 14 by a spring. If the friction facings 16, 18 are worn and the shoes move far enough for the projection on the strut 22

to engage the edge of the aperture 36 to cause the lever 24 to rotate anti-clockwise as shown in Fig 1. The pawl 32 rotates clockwise against the force of the spring 34 and, if the adjuster lever moves far enough the teeth 26, 30 on the adjuster lever and pawl ride over one another and the adjuster lever 24 moves one tooth or more further than the pawl 32. The teeth 26, 30 prevent the adjuster lever 24 from rotating back again when the shoes 12, 14 are released so the strut 22 holds the shoes 12, 14 further apart ready for the next brake actuation.

Referring to Figs 2, 3 and 4, locking means in the first embodiment of the invention comprises a locking member 40 rotatably mounted in a hole 42 in the shoe 12, and a lever 44 having one end connected to the locking member, and another end connected to a bimetallic strip 46. The bimetallic strip 46 is in the form of a coil having its inner end mounted on the shoe 12 and its outer end connected to the lever 44. The bimetallic strip 46 is mounted on the shoe 12 near to the friction facing 16 so that heat generated in the friction facing is passed easily to the bimetallic strip.

The locking member 40 is cylindrical but has one surface portion cut away along a chord to form a flat engagement

surface 48. The locking member is mounted such that when the friction facing is cool, the engagement 48 is just clear of a curved surface 50 on the pawl 32, the curved surface having as its centre of curvature the axis of rotation of the pawl 32.

As the brake becomes hotter the bimetallic strip 46 coils up tighter and rotates the lever 44 and the engaging element 40 anti-clockwise as shown in Fig 2. When the brake reaches a certain temperature, the flat engagement surface 48 engages with the curved surface 50 on the pawl and prevents rotation of the pawl, which in turn locks the adjustment lever 24. This prevents over adjustment which would otherwise be caused by the shoes moving excessively far out due to expansion of the drum. Because the curved surface 50 on the pawl 32 and the engagement surface 48 on the engagement element 40 engage in frictional contact the pawl 32 and lever 24 can be locked in any of a continuous range of positions.

In another embodiment shown in Figs 5 and 6, the strip 146 can be coiled in the other direction so that it rotates the engaging element clockwise as shown in Fig 6. This has the effect of locking the pawl to the lever member 24.

Referring to Figs 7 and 10, in the second embodiment the shoe

112, lever 124, adjuster pawl 132, spring 134 and strut (not shown in Fig 5) are identical to the corresponding parts in the first embodiment of the invention, except that the adjuster lever 124 has a toothed curved surface 150 centred on its axis of rotation X (Fig 6).

The locking means comprises a cylindrical locking element 140 movable axially through a hole 142 in the shoe 112 and having a toothed surface 148 thereon, and a bimetallic strip 146 having one end mounted on the shoe 112 and the other end connected to the locking element 140. The bimetallic strip is formed as a flat strip with a bend 152 in the middle to raise it off the surface of the shoe 112.

When the brake is cool, the locking element is in the position shown in Fig 7 and the adjuster lever 124 is free to rotate anticlockwise as shown in Fig 5. When the shoe 112 becomes hot the locking element 140 is moved through the hole 142 and, at a certain temperature, comes into engagement with the curved surface 150 as shown in Fig 8 and the toothed surfaces 148 and 150 on the locking element and adjustment lever prevent rotation of the adjuster lever 124. The adjuster lever 124 can be locked in any of a range of discrete positions the distance between the positions being set by the size of the teeth.

CLAIMS

1. A drum brake assembly for a motor vehicle comprising an actuator mounted between opposed brake shoe ends and operable to move said ends apart to apply the brakes, and an adjuster comprising a strut having one end constrained to move with one brake shoe and the other end of the strut engaging a lever member, pivotted to the other brake shoe, to rotate the lever member in one direction of rotation if the brake shoe ends move apart by more than a predetermined amount, said lever member being engageable with a reaction member also pivotted to said other brake shoe and used to engage the lever member to allow rotation of the lever member in said one direction of rotation but not in the other, and a thermally responsive locking means engageable with said one member when said member is in any one of a range of positions.

2. A brake drum assembly according to Claim 1 wherein said one member is locked by frictional engagement between the locking means and the said one member.

3. A brake drum assembly according to Claim 1 or Claim 2 wherein the locking means includes a locking member rotatable into and out of engagement with said one member.

4. A drum brake assembly according to any foregoing claim wherein said locking means includes a lever, one end of which is acted upon by a thermally responsive element.

5. A drum brake according to Claim 4 wherein the thermally responsive element is mounted on said other brake shoe near the friction facing thereof.

6. A drum brake according to any foregoing claim wherein the locking means includes a coiled bimetallic strip.

7. A drum brake according to any foregoing claim wherein the locking means is arranged to engage a surface on a said one member which has a centre of curvature substantially on the axis of rotation of said one member.

8. A drum brake according to any foregoing claim wherein the reaction member is a pawl.

9. A drum brake according to any one of Claims 1 to 8 wherein said one member is the reaction member.

10. A drum brake as claimed in any one of Claims 1 to 8 wherein said one member is the lever member.

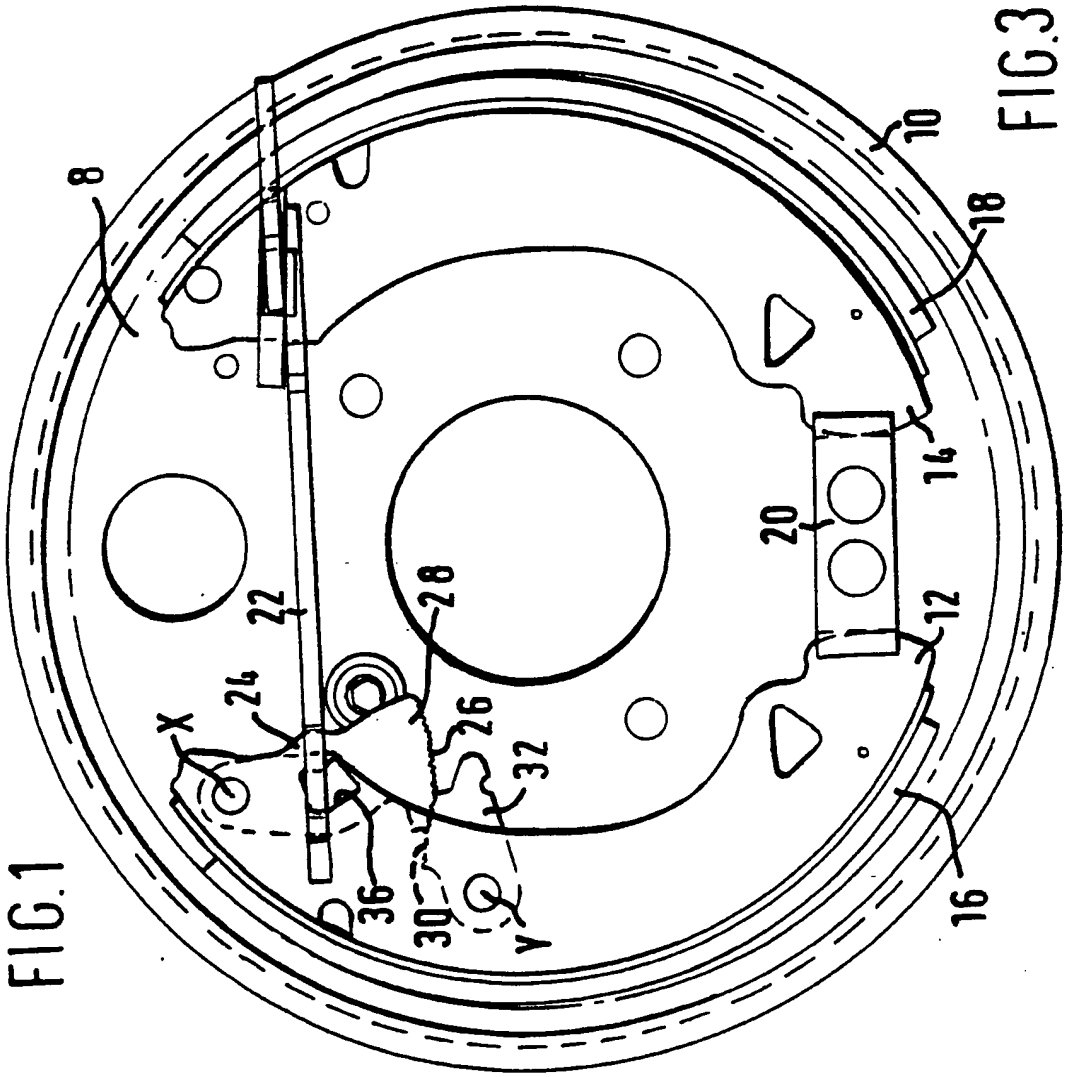

FIG.1

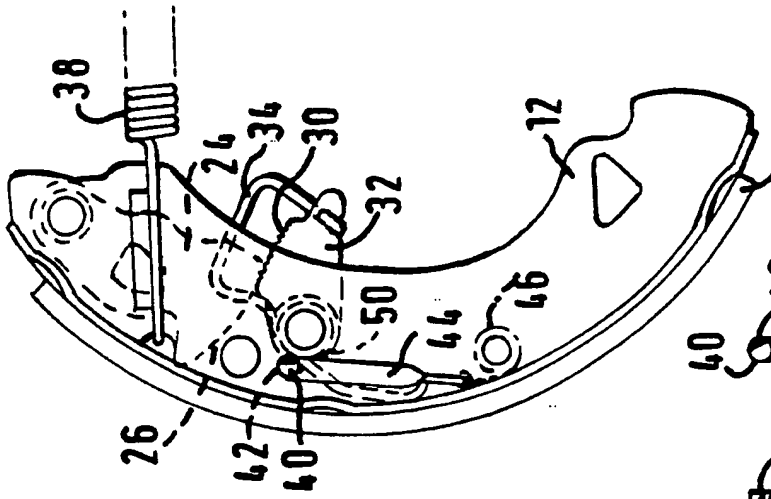

FIG.2

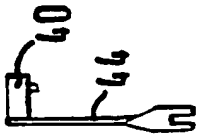

FIG.4

FIG.3

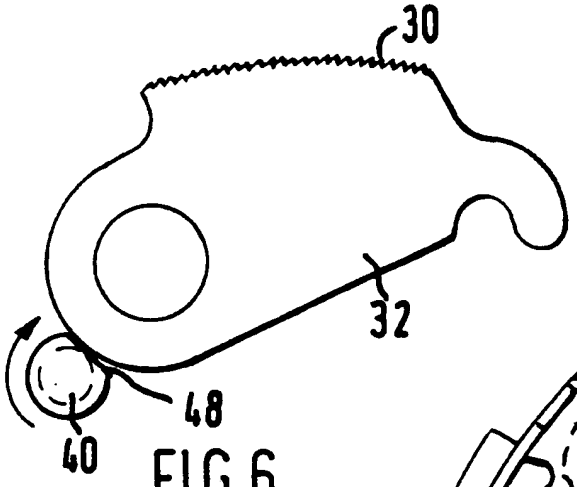

FIG.6

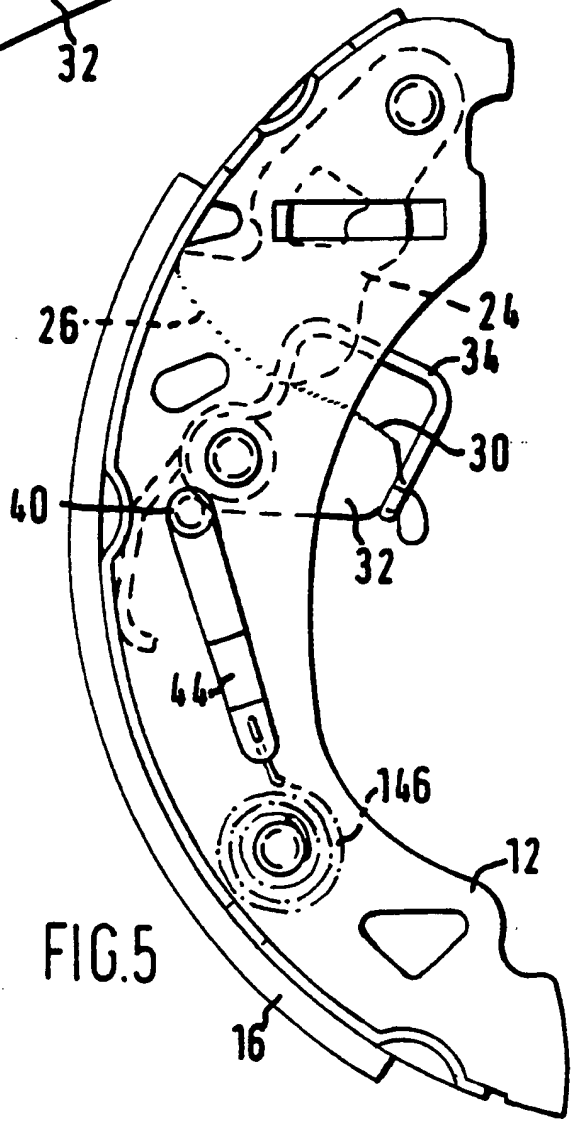

FIG.5

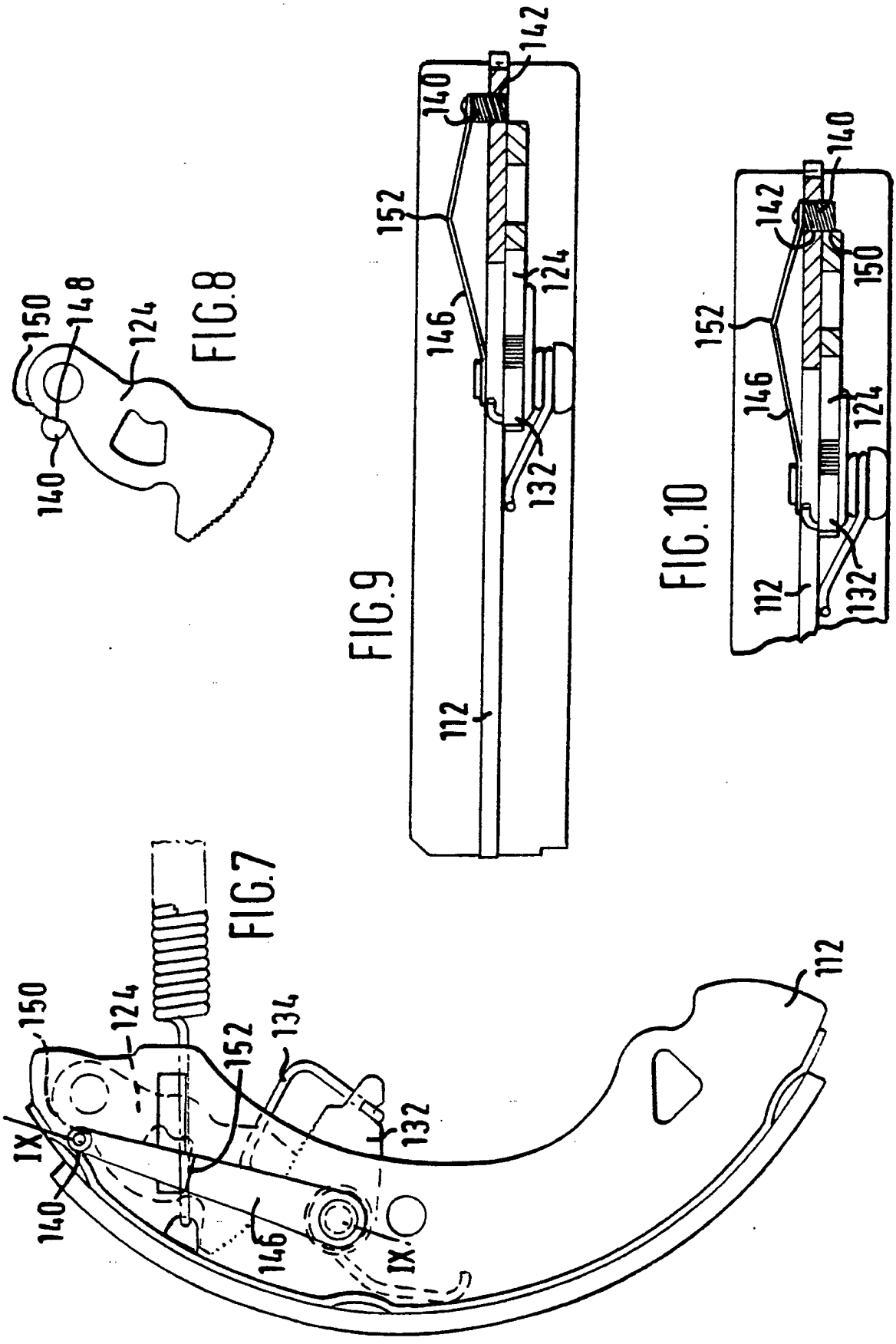

FIG.8

FIG.9

FIG.10

FIG.7

INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 92/00783

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 F16D65/52

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	F16D

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category °	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No.[13]
A	GB,A,1 483 693 (SOCIETE ANONYME D.B.A.) 24 August 1977 cited in the application see the whole document	1
A	GB,A,2 132 291 (ALFRED TEVES GMBH) 4 July 1984 see the whole document	1
A	GB,A,1 507 550 (GIRLING LIMITED) 19 April 1978 see the whole document	1
A	EP,A,0 276 611 (BENDIX FRANCE) 3 August 1988 see the whole document	1
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IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
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Category °	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	GB,A,549 914 (BENDIX LIMITED) 13 March 1946 see page 4, line 85 - page 5, line 25; figures 4,5	1
A	US,A,2 207 261 (G.S. LANE) 9 July 1940 see the whole document	1

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. GB 9200783 SA 58742

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 20/07/92
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